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CHAPTER 8 LOAD RATING GUIDELINES

SECTION 8.1 ANALYSIS

Load rating requires engineering judgment in determining a rating value that is applicable to maintaining the safe use of the bridge and arriving at posting and permit decisions. Parameters such as load factors and distribution factors should be determined by the Load Rating Team Leader using the latest American Association of State Highway and Transportation Officials (AASHTO) manuals. Stress levels for operating and inventory ratings should be determined by the Load Rating Team Leader using the latest AASHTO manuals. All superstructure elements for each bridge type should be load-rated in accordance with the latest AASHTO manuals.

SECTION 8.2 BRIDGE CROSS-SECTION AND GEOMETRY

The following guidelines should be used when computing load ratings:

- A bridge with a sidewalk or shoulder without a barrier on the traffic side will be analyzed for moment and shear capacity as though the entire bridge width were available for traffic.
- The distance between the centerlines of bearing is to be used for the span length for analysis purposes.
- In spans with variable stringer/beam spacing, live load distribution factors should be computed based on the average of the stringer spacing on either side. If an average spacing is used, this must be noted since a more exact model may be needed to rate a permitted vehicle.

SECTION 8.3 DECK SECTION ADJUSTMENTS

The following guidelines should be used when considering the role of the deck in load ratings:

- When computing section properties on a bridge with a one-course concrete deck, the Load Rating Team Leader will determine if it is appropriate to deduct the sacrificial wear surface thickness shown on the plans. Take note of all rehabilitations to ensure total sacrificial depth does not exceed the design sacrificial wear thickness. If the overall sacrificial depth exceeds the sacrificial wear thickness, the remaining deck thickness is to be used as the structural depth. Adjust the distance to the top reinforcing bars to represent final cover.
- A concrete overlay or bridge deck wearing surface should be considered as composite dead load, but is ignored as a structural slab on the initial rating calculations.
- If the overlay is needed to get realistic ratings, this may be used on subsequent calculations.
- When analyzing a bridge with precast concrete deck panels, it is state policy to treat the panel as being monolithic with the deck and analyzed as if it were a one-course pour.

SECTION 8.4 SUBSTRUCTURES

Substructures generally do not control the load rating. Load ratings shall be evaluated for substructures whenever they have a condition rating of 3 or less.

SECTION 8.5 REINFORCED CONCRETE

If details are not available for the reinforcing steel in reinforced concrete decks or girders, it is acceptable to assume 75 percent balanced design procedures were used.

SECTION 8.6 PRESTRESSED OR POST-TENSIONED CONCRETE

The following guidelines should be used when load rating prestressed or post-tensioned concrete bridges:

- Previous codes should not be used to determine the prestressed shear capacity.
- If the inspection of a prestressed box-beam bridge indicates longitudinal cracking, the cracked beam should be evaluated with a reduced number of strands. Using engineering judgment, assume that at least one strand on each side of the crack is not functioning. If rust is visible, it may be appropriate to assume that two or more rows of strands on each side of the rust stain are not functioning.
- Review box beam standards for depth and strand configuration based on the span length and spacing if details are not provided.
- The Indiana Department of Transportation (INDOT) no longer allows the use of a transformed section in design without permission from the design manager. Currently, INDOT code requires that a note on the plans indicates when a transformed section was used for the design of the beams. However, prior to this code change, designs may have incorporated the transformed section without any indication on the plans. A load rating assuming a nontransformed section may result in a lower rating than the original design capacity.

SECTION 8.7 STRUCTURAL STEEL

The following guidelines should be used when load rating steel bridges:

- Stiffeners should be included in the determination of the shear capacity.
- Girders that have been made with plates, angles, and channels may be modeled as equivalent plate girders.
- When load rating gusset connections for non-load-path-redundant steel truss bridges, reference FHWA-IF-09-014, *Load Rating Guidance and Examples for Bolted and Riveted Gusset Plates In Truss Bridges*, February 2009.

SECTION 8.8 FRACTURE CRITICAL BRIDGES

The following guidelines should be used when load rating fracture critical bridges:

- The load rating for steel fracture critical bridges with fatigue-prone connection details (pins, welds on fracture critical members in tension, E & E' fatigue details, etc.) will be rated if the connection shows any sign of deterioration, or if the dead load supported by the bridge has increased since the bridge was built.
- For load rating bolted or riveted gusset plates in truss bridges, reference FHWA-TA-5140.29, *Load-carrying Capacity Considerations of Gusset Plates in Non-load-redundant Steel Truss Bridges*, 15 January, 2008. Accordingly, the following actions are recommended to supplement the provisions of the AASHTO manual:
    - Bridge owners are strongly encouraged to check the capacity of gusset plates in new or replaced non-load-path-redundant steel truss bridges as part of the initial load ratings.
    - Bridge owners are strongly encouraged to check the capacity of gusset plates as part of the load rating calculations of existing non-load-path-redundant steel truss bridges conducted to reflect changes in condition or dead load, to make permit or posting decisions, or to account for structural modifications or other alterations that result in significant changes in stress levels.
    - It is recommended that bridge owners review past load rating calculations of non-load-path-redundant steel truss bridges which have been subjected to significant changes in stress levels, either temporary or permanent, to ensure that the capacities of gusset plates were adequately considered.
- When load rating gusset connections of non-load-path-redundant steel truss bridges, reference the analysis as described in FHWA-IF-09-014, *Load Rating Guidance and Examples for Bolted and Riveted Gusset Plates In Truss Bridges*, February 2009.

SECTION 8.9 TIMBER

The following guidelines should be used when load rating timber bridges:

- Design stress values should be based on species and grade as given in AASHTO when they are known or when they can be readily established. Assumptions can be made based on typical species within the area.
- Impact allowances shall not be applied to timber bridges.

SECTION 8.10 TRUSS BRIDGE WITH TIMBER DECK

For truss bridges with timber decks, the following elements should be load-rated as a minimum:

- Timber deck
- Steel stringers
- Floor beams
- Steel truss members